Zero Retries issue 0061 2022-08-26

Zero Retries is a unique, quirky little highly independent, opinionated, self-published email newsletter about technological innovation in Amateur Radio, for a self-selecting niche audience, that's free (as in beer) to subscribe.

About Zero Retries

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Pseudosponsor - Amateur Radio on the International Space Station (ARISS)

ARISS lets students worldwide experience the excitement of talking directly with crew members of the International Space Station, inspiring them to pursue interests in careers in science, technology, engineering and math, and engaging them with radio science technology through amateur radio. Please consider supporting ARISS.

Request To Send

Countdown to Digital Communications Conference 2022 - September 16-18, in Charlotte, North Carolina, USA:
~~**10**~~ ~~**09**~~ ~~**08**~~ ~~**07**~~ ~~**06**~~ ~~**05**~~ ~~**04**~~ **03** weeks…
Countdown to DCC 2022 Paper submission deadline - September 1:
~~**~08**~~ ~~**~07**~~ ~~**~06**~~ ~~**~05**~~ ~~**~04**~~ ~~**~03**~~ ~~**~02**~~ **~01** week…

Well, *that* was fun! I expected last Friday to be pretty mundane as I finished editing Zero Retries 0060. Then, news broke about the reveal of the Icom IC-905 - talk about *Zero Retries Interesting!* I published a brief description about the IC-905 in Zero Retries 0060, and then finished the associated Zero Retries Interesting Omnibus web page. Late that day, when I saw a mention that there would be a YouTube livestream as a formal intro of the IC-905, I was able to push out a "thread" (Substack's version of a Twitter tweet) approximately 10 minutes prior to the livestream. After the livestream I followed up with another thread of my initial impressions, and there were a number of interesting comments to that. Icom is certainly pushing the usual boundaries of an Amateur Radio commercial product and it will be interesting to see more details emerge about the IC-905.

de Steve N8GNJ

Icom IC-905 Longer Term Impressions

On 2022-08-19, Icom unveiled the Icom IC-905 VHF / UHF / SHF radio in conjunction with Ham Fair in Tokyo, Japan. The introduction was a well-produced prerecorded video initially livestreamed on YouTube, using machine narration.

Icom UK has now posted a two page flyer (PDF) which is the *only* detailed information I can find about the IC-905.

The unit discussed and documented appears to be intended for Japan; there is no information (that I've found) about versions of the IC-905 for regions such as North America that have different Amateur Radio spectrum allocations than Japan. Thus, all mentions of frequencies below are for the Japan version.

The basics of the IC-905:

- Two piece system - Control Module (CM) (display) is inside (desktop) and an RF Module (RFM) (mounted near the antennas). The CM obviously based on the form factor of the Icom IC-705.

- DC power is supplied to the CM and the CM supplies power (and data) to the RFM via a supplied (hardwired on the RFM) outdoor-rated Ethernet cable. The length of the included cable isn't stated, though the video makes reference to "… even if the CM and RFM are 20 meters apart…".

- Worth reiterating - *all* the RF circuitry is in the RFM. There is some speculation that RF is being generated in the CM and conducted on the Ethernet cable and then transverted and amplified in the RFM, but that scenario seems unlikely.

- Radios for 144 MHz, 430 MHz, 1200 MHz, 2.4 GHz, and 5.6 GHz are built-in. There is also a GPS receiver that is used a frequency reference for frequency stability.
- Icom offers an optional 10 GHz transverter (CX-10G) that uses the 2.4 GHz radio.
- Power output for the 144 MHz, 430 MHz, and 1200 MHz radios is 10 watts via a single Type N connector.
- Power output for 2.4 GHz and 5.6 GHz radios is 2 watts via individual SMA connectors.
- Power output for the CX-10G (10 GHz) is 0.5W - the connector wasn't specified.
- The GPS receiver has an SMA connector and is shown with a "rubber duck" antenna.
- (Analog) Amateur Television is a built-in mode. Transmitting live ATV images requires a user-supplied external analog camera.
- Connectivity with a computer includes an SD card slot, an Ethernet connector, and a USB-C connector.
- Digital Data mode for 128 kbps data communications. To date that's also been implemented in the Icom ID-1 and ID-9700 on 1200 MHz. RTTY was also stated as a built-in mode.
- Icom is offering various antennas, in various configurations, for the various bands. One video I saw with a mockup of a tower with the RFM + CX-10G + Icom's antennas looks… kind of cool, actually (at least to me)!
- Other Input / Output on the CM:
    - AV Input
    - AV Output
    - CW Key Jack
    - External Speaker
    - Microphone
    - SEND (?)
    - All apparently 2.5 mm plugs.

Unqualified opinions follow. I don't currently work microwave, or space… but I want to.

This isn't an Amateur Radio unit for the masses. It's designed for some specific market segments:

- Those that want any "new hotness" in Amateur Radio; the cost-is-no-object early

adopters.

- Microwave contesters; this is going to be a very popular radio especially for mobile microwave contesters. It's more compact and integrated than anything else, perhaps only requiring power amplifiers.

- Those that are curious about CW, FM, SSB, and even D-Star operations on 2.3 / 2.4 GHz, 5.x GHz, and especially 10 GHz.

- It's to be determined if the IC-905 is a good fit for operating through the geosynchronous QO-100 Amateur Radio payload in the Eastern Hemisphere which uses 2.4 GHz uplink and 10 GHz downlink. At a minimum, it can probably be configured for the narrowband operations of QO-100. Ideally it could be configured for the wideband / high speed operations.

- Maybe it's a better fit for VHF / UHF low power operations as there's virtually no feedline loss when the radio can be located a few feet from the antenna on a tower.

- The IC-905 might be a good fit for VHF / UHF satellite operations with all the RF on the tower instead of long feedlines, especially at 1200 MHz.

- The IC-905 might also turn out to be "wildcard popular" with the space experimenters such as meteor scatter and Earth-Moon-Earth.

- I'll go out on a limb and predict that Amateur Television (despite the deficiencies noted below) will become a very popular feature of groups of Amateur Radio Operators in major cities that buy IC-905s. There will quickly be a lot of ATV repeaters going on the air, especially on 1200 MHz.

Icom didn't optimize the IC-905 for either fixed, or mobile use. Icom clearly wanted to make it possible to operate the IC-905 as a mobile unit for uses such as microwave contesting from mountaintops, etc. and thus be mostly self-contained without *requiring* a computer. But it also includes USB-C and Ethernet for connectivity for fixed use. The design choices for that flexibility will make some mobile users unhappy, and some fixed users unhappy.

The optional CX-10G for adding 10 GHz capability seems (to me) like an afterthought and it adds a lot of complexity in cabling and yet another box to accommodate to an otherwise pretty streamlined and compact system. If it were me, I would have pushed to include 10 GHz as a standard feature of the IC-905. It's already going to be an expensive unit, and the additional few hundred dollars (wild-ass guess on my part) wouldn't be noticed.

Overall… pretty neat! But there are some serious flaws / omissions for such a radio in the era of computer connected radios in 2022.

- Data communications seems to have been overlooked or at best, just "more of the same". Channel sizes, and thus data rates, on 1.2 GHz, 2.4 GHz, 5.6 GHz, and 10 GHz are all much wider than VHF and UHF, so there could have been a better data mode than "DD" which is a now 30 year old standard.

- (Analog) Amateur Television has begun to migrate to Digital Amateur Television, and it's surprising that Icom didn't provide for an evolution of ATV to DATV.

- I was surprised that the IC-905's only video input was for an analog television camera, but I suppose that was the easiest way to implement a camera. It seems to me that USB webcams are ubiquitous and inexpensive, but only "easy to use" with the power of a computer, easy automatic downloads of driver software, etc. So after thinking it through a bit, I now understand this design choice. Perhaps there will be an option to connect a laptop or desktop with a webcam to provide live video input to the IC-905.

- No video output? Perhaps that's totally unnecessary and video can be routed to an external computer for display on a larger display. I'll guess that no dedicated video output was one of those design choices driven by the desired flexibility of mobile and fixed operation.

- Put me down as skeptical about the adequacy of "Power Over Ethernet" to supply 10 watt VHF / UHF transmitters via twisted pair (Ethernet) cabling. Icom has undoubtedly done the math, but that choice of not providing at least the option of a dedicated power input into the RFM… we'll have to wait and see how that works out in the real world… especially when the distance between the CM and RFM exceeds the length of the supplied cable, and a cable extension is required. Note that Icom said "Power over Ethernet" - generic description, but didn't name a POE standard like 802.3AF. I'll guess that Icom uses different voltages than is standard, or perhaps even larger wires than standard Ethernet. Thus, it seems likely to me that when a cable extension is required, Icom will have to offer a "power booster" module for such situations.

- There was no indication that the connection between the two units can be virtualized via Internet. All the illustrations showed the control unit connected directly to the external unit. Thus, if you want to use it from a remote location, you'll probably have to do all the operating from a computer display / keyboard / mouse.

Of course, there are many, many unknowns:

- Accessories - some can be inferred from the Icom IC-705 from which the CM is derived. Microphone, mounting options, etc. Will Icom offer a camera for the IC-905? Not stated.

- Features / modes such as full duplex? The manual will be a fascinating read.

- Features via firmware upgrades, interoperability with a computer, etc.

I look forward to the official release of the IC-905, and when there are significant developments, they'll be covered here in Zero Retries.

ARISS Now Supports Simultaneous APRS and Voice

(Info is from ARISS, but this version has a stable, static URL.) From ARRL News:

> 08/15/2022 - ARISS, Amateur Radio on the International Space Station,

announced that simultaneous operations of the ARISS Voice Repeater and digital APRS communications on the Space Station is now a reality. Current ARISS operations include voice repeater transmissions with the JVC Kenwood D710GA in the Columbus module and APRS packet operation from an identical radio in the Service Module (Zvezda). Packet operations are on 145.825 MHz.

The ARISS Russia and USA teams have been working for several weeks to prepare the Service Module radio for APRS operations. ARISS Russia team member Sergey Samburov, RV3DR, led the effort, working with Russian mission controllers and the on-board ISS cosmonauts to configure the Service Module radio for APRS ops. On August 11, final checkouts were completed and the APRS packet mode was switched on for amateur radio use.

ARISS-International Chair Frank Bauer, KA3HDO, said, "Simultaneous operation of APRS and the voice repeater on ISS is transformative for ARISS and represents a key element of our ARISS 2.0 initiative, providing interactive capabilities 24/7 that inspire, engage and educate youth and lifelong learners—especially life-long learning in ham radio operations. … Our heartfelt thanks to Sergey Samburov, RV3DR, for making this crucial ARISS 2.0 initiative become a reality."

The Columbus Module radio uses the call sign NA1SS and the new Service Module radio uses RS0ISS. Aside from the call signs, the radios are identical and packet operations are the same as before. Hams can use RS0ISS, ARISS, or APRSAT as the packet path. Also, both radios are expected to be on full time, except during educational contacts, EVAs, and dockings or undockings.

You can find operational status and expected downtimes of the ISS radios at https://www.ariss.org/current-status-of-iss-stations.

Which says:

Current status of ISS ham radio stations as of August 23, 2022

- Columbus Module radios:
    - IORS (Kenwood D710GA) – STATUS - Configured. Default mode is for cross band repeater (145.990 MHz up {PL 67} & 437.800 MHz down).
        - Powered OFF for Russian EVA on September 02. OFF about 08:30 UTC on Sept 2. ON about 10:00 UTC on Sep. 3
        - Capable of supporting USOS scheduled voice contacts, packet and voice repeater ops.
- Service Module radios:
    - IORS (Kenwood D710GA) – STATUS - Configured. Default mode is for packet operations (145.825 MHz up & down).

- Powered OFF for Russian EVA on September 02. OFF about 08:30 UTC on Sept 2. ON about 10:00 UTC on Sep. 3
- Capable of supporting ROS scheduled voice contacts, packet, SSTV and voice repeater ops.

Timewave's Data Communications Products

After last issue's big update of the **Zero Retries 0060 Omnibus of Zero Retries Interesting Information**, I decided to start earlier for the Zero Retries 0070 version.

Part of that is revisiting subjects mentioned in previous issues of Zero Retries, and in doing so I checked out Timewave, where I noted that that the venerable PK-232 has been significantly updated into the PK-232SC:

> PK-232SC Now with USB Audio, Rig Control and Single USB Computer Cable!

The classic PK-232 modes are all there:

> Pactor, VHF / HF Packet, AMTOR / SITOR, Baudot, ASCII, Morse, HF Weather FAX, TDM, and NAVTEX

But there's now a sound card built-in for all of those new audio interface modes - WSJT-X, fldigi, etc. When you consider that there's (hardware!) rig control built in, scope outputs, ports for two radios… the PK-232SC looks worthy of consideration.

But wait - *there's **more***!

The PK-232 / PSK (confusingly logo'd as the PK-232 DSP in the upper right corner of the unit) is apparently a new product that seems to be a combination of some of the features of the PK-232 but with only sound card interface and DSP:

> Sound card interface with dual transformer isolation. Brand New, complete with Sound Card Interface and DSP installed, lower current draw for cooler operation, external reset switch and an overload LED on the front panel!
>
> …
>
> Timewave's Powerful DSP Technology Improves the PK-232! Timewave's customers swear by their DSP filters and PK-232 owners love the flexibility and reliability of the most popular data controller ever built. Now with the addition of a sound card interface, the PK-232/PSK rolls it all into one! The PK-232/PSK brings a new level of performance to the legendary PK-232 with sharp, accurate DSP filters for all its internal data modes and dual transformer isolation for sound card data modes. Weak signals magically appear from the noise and QRM bounces off the new DSP filters for cleaner copy with fewer errors than the old analog filters.

On Timewave's Amateur Radio Products page, the DSP-232+ Dual Switchable Port DSP

Multi-Mode Data Controller is shown as discontinued. Curiously, the DSP-232+ is shown as an available product on Timewave's Communications & Signal Processing Products For Marine Applications page.

Thus, it seems a reasonable guess that the features (and hardware?) of the DSP-232+ were migrated into the PK-232 / SC for better (more economical?) use of a more common enclosure and more familiar form factor.

The Navigator Sound Card Modem and the PK-96 Packet TNC round out Timewave's data communications products for Amateur Radio.

Timewave's Communications & Signal Processing Products For Military and Government Applications page mentions these data communications products:

- **PK-96** Short Range VHF/UHF Data Communication & Telemetry - Info
- **PK-232/DSP/BAL** Long Distance HF Data Communication - PDF Datasheet
- **DSP-232** Long Distance HF Data Communication - HTML Datasheet, PDF Datasheet
- **DSP-D300** ALERT / IFLOWS Decoder - HTML Datasheet, PDF Datasheet, Support
- **U232** - RS-232 to USB PC board mount R-A Conversion Module for legacy RS-232 DB-9 & DB-25 replacement PDF Datasheet, Support
  OEM versions available **NEW!**

… though that page is © 2007-2014.

A quick check of a major Amateur Radio retailer showed the PK-232SC**+** (no mention of the "+" on the Timewave website), the Navigator, and the PK-96. There was no mention of the PK-232 / SC.

No disrespect intended, but Timewave would benefit from a significant website refresh.

ZR > BEACON

- **IC-905 Mailing List** - In my mind, it's a record that a new mailing list for the IC-905 was formed within minutes of the official Introduction video of the IC-905. Kudos to Adam Farson VA7OJ / AB4OJ and Jim Boehner N2ZZ for forming the ic-905@groups.io mailing list. To date, that's been a good source of informed discussion. Within a few hours the subscriber numbers exceeded the free tier of groups.io, so VA7OJ and N2ZZ stepped up to fund the list at a paid tier and asked for donations to help sustain this new list. I'm in for $25.

- QO-100 TX - This is a neat project, a CW-only, 450 milliwatt, 2.4 GHz transmitter for

the geostationary QO-100 payload over the Eastern Hemisphere:
QO-100 SAT CW Transmitter with OLED Display using 2.4 GHz LoRa module with TCXO by OM2JU and OK1CDJ *https://www.nicerf.com/products/detail/500mw-2-4ghz-lora-wireless-transceiver-module-lora1280f27-lora1281f27.html Only one DIGI mode possible - SLOW Hellschreiber - need bigger dish than 80cm - only beacon implemented yet. Maximal power output is 450mW. It is enought to work over satellite with 60cm DISH, but tested also with 35cm and helix feed.*
My thanks to Jeff Davis KE9V for the pointer.

- KB6NU - DEFCON 30 was overwhelming Sounds like my ARDC colleague Dan Romanchik KB6NU had a good time at the 2022 DEFCON conference in Las Vegas a few weeks ago, including a good amount of Amateur Radio involvement.

Zero Retries Poll

Last week's poll - 26 votes:
Is the Omnibus useful information?
Yes - it's useful. 92%
No - prefer to have just news. 8%

Zero Retries Sponsorships

The Zero Retries sponsorship model is *evolving*, but it's initially inspired by the Daring Fireball blog's sponsorship model (other than this sponsorship cost). Some initial points:

Sponsorship of Zero Retries is only available to "Zero Retries Interesting" companies, organizations, individuals, and projects. Ideally, a Zero Retries sponsor is involved in Amateur Radio, but that's not an absolute requirement. If an individual or company would like to sponsor Zero Retries, but prefer to remain anonymous, that's acceptable, but the "Zero Retries Interesting" criteria still apply.

- Sponsorships are limited to a *brief* mention in Zero Retries - a few sentences at most (but prominently displayed). Example - "WhizzyPacket is proud to sponsor this week's Zero Retries". More targeted sponsorship messages are acceptable, such as "WhizzyPacket is looking for a few good engineers - click here".

- A sponsorship is for *one* weekly issue of Zero Retries and is exclusive - one sponsor per week. Sequential sponsorships are available - as much as three months of sponsorship is acceptable. Longer than three months, let's discuss it.

- Lastly, although it kind of defeats the overt purpose of sponsorship, if a *Zero Retries Interesting company, organization, individual, or project cannot afford to pay for a sponsorship*, but wants / needs to "get the word out", Zero Retries can probably work something out. In fact, if there are gaps in sponsorships, I'll probably create some gratis sponsorship messages.

If you are interested in sponsoring Zero Retries, please reach out - it's early days. More importantly, if you know of a company, organization, project, or individual that you think could / would / should sponsor Zero Retries, *please point out Zero Retries to that entity*.Join the *Fun* on Amateur Radio

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If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
Join the Fun on Amateur Radio for some pointers.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with wireless technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to anyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*
- Pseudostaffer Dan Romanchik KB6NU for continuing to spot, and write about "Zero Retries Interesting" items on his blog that I don't spot on my own.
- Amateur Radio Weekly and Southgate Amateur Radio News consistently surface "Zero Retries Interesting" stories.
- The Substack email publishing platform makes Zero Retries possible. I recommend it for publishing newsletters.

If you're reading this issue on the web and you'd like to see Zero Retries in your email Inbox every Friday afternoon, just click:

Subscribe now

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Zero Retries is on Twitter @ZeroRetries - just click:

Zero Retries on Twitter

Please tell your friends and co-conspirators about Zero Retries - just click:

Share Zero Retries

Offering **feedback or comments** for Zero Retries is equally easy; yes, you guessed it… just click:

Leave a comment

Email issues of Zero Retries are “instrumented” by Substack to gather basic statistics about opens, clicking links, etc. I don’t use such information in any way other than seeing that most subscribers actually do read Zero Retries.

More bits from Steve Stroh N8GNJ:

- SuperPacket blog - *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*

- N8GNJ blog - *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs - Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted in beautiful Bellingham, Washington, USA
2022-08-26

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